REMARKS

Claims 33 and 43-51 are pending. Claims 49-51 have been added to enhance the scope of patent protection for Applicant's invention. The support for claim 49 is found in lines 9-13, on page 17, of Applicant's specification. The support for claim 50 is found in lines 23-26, of page 17, of Applicant's specification. The support for claim 51 is found in lines 28-30, of page 17, of Applicant's specification. It is respectfully submitted that no new matter has been added.

The Patent Office rejected claims 33 and 43-48 under 35 U.S.C. 103(a) as being unpatentable over the Background of the Invention (BOI) in view of Dent, U.S. Patent No. 5,790,549.

Claim 33 recites "A method for operating a mobile station in a circuit switched mode, comprising the steps of generating a data word; and **transmitting the data word using an unused portion of a slot, containing an interleaved signaling word, by interleaving the data word with the signaling word.**"

Claim 46 recites "A method for operating a mobile station in a circuit switched Data mode during an internet connection, comprising the steps of generating at least one HTML code; and **transmitting the at least one HTML code within an unused portion of at least one reverse link time slot by interleaving the HTML code with a mobile station signaling word.**"

Claim 47 recites "A mobile station comprising an RF transceiver, a user interface and a controller for operating said mobile station in a circuit switched Data mode during an internet connection, said controller being responsive to at least one HTML code being generated for **transmitting the at least one HTML code within an unused portion of at least one reverse link time slot by interleaving the HTML code with a mobile station generated signaling word.**"

The Patent Office asserted (pages 1-2 of the Office Action mailed August 11, 2005)

> As per Claims 33, 43-48, Admitted prior art substantially discloses the claimed approach of operating mobile station on pages 1-5, comprising data generation, data/controlling data interleaving, and transmission in a time slot along with channel measurement data, reverse link time slot means and associated data transfer protocols, such as those for MAHO, HTML, internet. {See Admitted prior art, Figs. 3a-c.}
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> Not specifically described in detail in Admitted prior art is the step of data transfer for transferring the original data and other data in unused portion of a slot.

However Dent, in an analogous art, discloses data transfer via an original time slot that is partitioned into plural sub-slots wherein plural data and controlling data are interleaved and transmitted in said subslots to effectively use all previously unused portions of said original slot. {See Dent, Id., e.g., col. 4 lines 8-66, col. 5 line 40 et seq., col. 6 line 7 et seq., and Fig. 1}

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the procedure in the Admitted prior art by including therein time slot partitioning as taught by Dent, because such modification would provide the procedure disclosed in Admitted prior art with a technique wherein "data transfer along with associated costs is optimized." {See Dent, col. 7 line 39 et seq.}

Applicant's Background of the Invention recites, in pertinent part, as follows:

FIGS. 3A-3C depict the frame, normal reverse link slot format, and abbreviated reverse link slot format, respectively, for an exemplary prior art digital Time Division Multiple Access (TDMA) cellular air interface known in the art as IS-136 (see, for example, Section 4.4 of IS-136.1, Rev. A, Mar. 21, 1996 and IS-136.2, Rev. A, Feb. 12, 1996). The reverse link is considered to be in the direction from a mobile station (MS) to a base station (BS), which forms a part of a Base Station/Mobile Switching Center/Interworking function (BMI).

FIG. 3A shows that a 40 millisecond frame consists of six time slots. Slots 1-3 and 4-6 each comprise one TDMA Block. In the reverse direction from the mobile station to the base station, which is a case of most interest to this; invention, the frames may be continuously transmitted. A given mobile station is assigned to transmit in one slot per frame for a half data rate case, and is assigned to transmit in two time slots for a full data rate case.

FIG. 1B illustrates one time slot of a Digital Control Channel (DCCH) that is transmitted to the BMI on a reverse channel. The slot starts with a bit guard (G) field, a sill bit ramp (R) field, a 16-bit preamble (PREAM) field, and a 28-bit (14 symbol) SYNC word/time slot identifier field. The SYNC word/time slot identifier field is used for slot synchronization, equalizer training, and time slot identification. These fields are followed by two 122-bit DATA fields separated by an additional synchronization field (i.e., the 24-bit SYNC+ field).

FIG. 1C illustrates one abbreviated time slot of the Digital Control Channel (DCCH) that is transmitted to the BMI on a reverse channel. It can be noted that the second data field is shortened to 78-bits, and a 44-bit abbreviated guard (AG) field is added during which time the mobile station maintains a carrier off condition.

IS-136.1, Rev. A, describes in Section 4.4.3.1 a channel encoding technique, in Section 4.4.3.2 an intraburst interleaving technique for the DATA fields, and in Section 4.4.3.2.2 an interleaving scheme and algorithm for transmitting the encoded data bits of the DATA

fields in the normal length burst case of FIG. 1B, and the abbreviated length burst case of FIG. 1C.

Many modern digital cellular communications systems, including IS-136, support a Discontinuous-Transmission, (DTX) mode of operation wherein the mobile station, transmitter autonomously switches between two transmitter power levels while the mobile station is in a conversation state. By example, the mobile station can enter a DTX_Low power state during a pause in speech, thereby conserving battery power. In the IS-136 system DTX operation can be initiated by the mobile station when on either an analog voice channel or a digital traffic channel, if permitted by the base station in broadcast control channel signalling.

While in the DTX low power state the mobile station may still be required to periodically send channel quality measurements taken on adjacent base stations as a part of a Mobile Assisted Handoff (MAHO) operation. Reference in this regard can be had generally to IS-136.2, Rev. A, Section 2.4.5, and in particular to Section 2.4.5.3 "MAHO Operations with DTX Operation".

Also while in the DTX low power transmitter state the BM:I: generates so-called "comfort noise" (CN) based on comfort noise parameters that are received from the mobile station. The use of comfort noise insures that the called party will hear a background noise component that is consistent with a normal conversation, as opposed to a complete and unnatural cessation of background noise due to the transmitting mobile station's transmitter being turned off or substantially reduced in power.

If the base station requires, the mobile station may not ramp down to the lowest possible transmitter power level, but may instead maintain a predefined minimum transmitter power such that adjacent base stations are able to use so-called digital locate receivers to monitor the mobile station's transmissions for power measurement and/or other purposes. In true DTX, the mobile station can completely terminate transmissions, thereby conserving a maximum, amount of mobile station power.

However, the system specification defined in IS-136.1 and. IS-136.2 does not include any definitive way for the mobile station to indicate to the BMI the beginning of the DTX mode. As a result, a decoder in the BMI cannot readily determine whether to employ bad frame masking because of lost slots due to fading (See IS-136.2, Section 2.2.2.2.3.2), or whether to generate comfort noise based on CN parameters. In addition, the BMI cannot locate the so-called hang-over slots, on which the BMI computes basic parameters for the background noise. The location of the hangover slots is important, since if the BMI does not receive the comfort noise parameters in the beginning of the slot, it must use the previously derived comfort noise until the next comfort noise parameters are received.

Due to the above-mentioned interleaving, the data bits of a last slot that is

transmitted before entering the DTX_Low State have been unused. Currently in IS-136 a two slot; interleaving technique is used (see IS-136.2, Figure 2.1.3.3.3.2-1 and Section 2.1.3.3.4), which leaves 130 bits (half of a 260 bit slot) unused in the last slot. The last slot transmitted is typically a Fast Associated Control Channel (FACCH) slot, which is defined as a blank-and-burst channel used for signalling exchange between the mobile station and the base station.

It has been proposed in IS-136 (see contribution TR45.3.5/97.03.25.04) that a 68-bit truncated slot be used as a transmit (TX) slot when the mobile station is in the DTX_Low State. A revised contribution in this regard is TR45.3.6/97.06.10. Comfort Noise parameters have been proposed to be carried as FACCH messages on the FACCH channel.

In the existing Global System for Mobile Communication (GSM) DTX operation, the entry to the DTX mode is indicted by CN parameters sent with inband signaling. However, if for some reason this inband signalling is not received, the BMI will execute the bad frame masking procedure that repeats previous speech frames. In IS-136 the CN parameters are sent as FACCH messages, and similarly if the BMI fails to receive the CN parameters, or some other indication of the mobile station's entry to the DTX mode, the BMI will enter the bad frame masking procedure (see IS-136.2, Section 2.2.2.2.3.2).

As can be appreciated, the failure by the BMI to determine when the mobile station has entered the DTX mode can result in an objectionable audible signal being generated due to the repeating of the last received (good) speech frame.

A further existing problem of the DTX mode as currently specified relates to the number of slots that must be sent from the mobile station to the BMI while the mobile station is in the DTX_Low State. These slots are used, typically, for sending the CN parameters.

Contrary to the Patent Office's assertion, Dent does not appear to recite any time slot partitioning. Furthermore, Dent does not appear to disclose or fairly suggest "**transmitting the data word using an unused portion of a slot, containing an interleaved signaling word, by interleaving the data word with the signaling word,**" "**transmitting the at least one HTML code within an unused portion of at least one reverse link time slot by interleaving the HTML code with a mobile station signaling word,**" or "**transmitting the at least one HTML code within an unused portion of at least one reverse link time slot by interleaving the HTML code with a mobile station generated signaling word.**" (Applicant's Background of the Invention does not disclose or fairly suggest these limitations either.) Instead, Dent recites in the most relevant passages of the detailed description:

A wideband CDMA system, in accordance with the present invention, is constructed by dividing an allocated channel bandwidth (e.g., 800 KHz) into a number N of subchannels (e.g., eight subchannels each having a 100 KHz bandwidth) and a number M (e.g., eight) of timeslots. The limiting case of M=1 corresponds to continuous transmission in N subchannels and is also encompassed by the present invention.

The total channel bandwidth may be shared by L users by allocating a fraction of the timeslots and a fraction of the subchannels to carry traffic for each user. For example, L/M users may be allocated the same timeslot on all N subchannels. Although the allocation of timeslots and subchannels may be made in a variety of ways, this description focuses on the exemplary case where all subchannels are used by each user in a single timeslot, i.e., each user has the same data rate. This choice is made for brevity and simplicity of the description without restricting the scope of the invention. However, the present invention also includes all cases of providing variable data rates when employed with interference reduction, interference-subtractive or joint demodulation algorithms to enhance capacity.

FIG. 1 shows an exemplary signal comprised of eight 100 KHz frequency channels within an 800 KHz total receive bandwidth and divided into eight timeslots of a repeating TDMA frame period. A first user (USER 1) is allocated slot 1 on all eight carriers to receive signals from a base station. A second user (USER 2) is allocated slot 2 on all eight carriers. **Other users could be allocated, for example, two slots on all eight carriers to receive twice the data rate or one slot on half the carriers to receive half the data rate.**

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Each slot can contain a number of overlapping CDMA signals. Thus, USER 1 can be considered to be "USER GROUP 1" while USER 2 denotes "USER GROUP 2". Each group of overlapping users may contain, for example, up to 10 individual users of which five on average have signals transmitted to them while the other five traffic signals are temporarily silent due to the other party being the active speaker. One of the active signals in each subchannel and slot may be a permanently-transmitted Broadcast Control Channel (BCCH) which is used for alerting idle mobiles to a call from the network and for broadcasting various overhead information, e.g., network and station ID information and information on surrounding base stations.

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An exemplary superframe structure composed of 4.times.26 TDMA frames is shown in FIG. 2. This exemplary superframe structure allocates TDMA frame numbers 1 to 12 to traffic. Frame 13 is not used for transmitting traffic in this exemplary format and is an IDLE frame that the receiver can employ for other purposes such as scanning other base station frequencies to determine if it is desirable to listen to a different control channel.

The next 12 frames are also used for traffic and **the 26th frame is used to transmit one slot of Slow Associated Control Channel information (SACCH). The SACCH is used to convey less urgent overhead information which is repeated relatively less frequently than other overhead information, e.g., that broadcast on the BCCH. The above format applies to every subchannel in this exemplary embodiment.** The format may be synchronized or staggered between the subchannels. The exemplary superframe repetition period of 104 TDMA frames spans 480 mS. One complete SACCH message is therefore transmitted every 480 mS.

The above slot parameters and superframe formats are derived from the GSM digital cellular TDMA system with a view to simplifying the construction of mobile phones that can function in both GSM systems and systems operating in accordance with the present invention. The formats described above, and below, are merely exemplary and are not intended to limit the scope of the invention. They are instead provided to further describe exemplary format organizations in accordance with systems incorporating the present invention.

Over one row of the superframe structure lasting 120 mS, 24 traffic slots are received per subchannel each containing an access code, such as a (64,6) Walsh coded information symbol. Thus, after Walsh decoding of the 64-bit codeword, six bits of information are obtained, giving 6.times.24 bits per subchannel per 120 mS. The raw information rate is thus 1.2 KB/S per subchannel, or 9.6 KB/S when all eight subchannels are used. The raw information rate of 9.6 KB/S or 192, 6-bit symbols per 120 mS may be error protected using, for instance, Reed-Solomon codes to correct symbol errors or erasures. For example, the 192 symbols can be divided into four groups for coding in the following ways:

63,53 RS coded yielding 53 6-bit decoded symbols
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3.times.6 bits rate 1/3rd yielding 6 decoded bits or 2 per RS block
TOTAL 192 coded symbols yielding 160 decoded symbols per 120 mS or 53.times.6+2=320 bits per 40 mS

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Transmitting an ITU coded block of 80 bits using all eight subcarriers and one slot in two consecutive frames introduces little transmission delay. However, in accordance with an exemplary embodiment, it can be preferable to interleave the transmission of speech blocks over longer periods to provide protection against fading. This can be preferable because, for example, the error correction coding operates most effectively when the probability of error is not correlated between successive symbols or symbols within a coded block. This correlation is reduced by spacing the 63 RS coded symbols of one coded block (in the above example) over eight or more frames. In eight frames, 64, 6-bit symbols are decoded from the eight subcarriers.

Of these, 63 are applied to the RS decoder while the remaining symbol is applied to the rate 1/3rd decoder. The rate 1/3rd decoder can, for example be configured as six, rate 1/3rd bitwise convolutional decoders operating on each bit of the symbol. The same decoder can be time-shared six times because of the very low information rate of individual bits.

The SACCH and traffic symbols can be interleaved over 25 frames, excluding the IDLE frame. A distinct IDLE frame, in which the receiver receives neither traffic nor SACCH, is desirable so that the receiver has the freedom to perform various functions, e.g., to change which 800 KHz block of eight 100 KHz channels is received during that frame. It is also desirable, although not necessary, to restrict SACCH transmissions to the same frame (e.g., frame 26 in the repeating structure of FIG. 2) so that, during periods of voice inactivity, the other 25 traffic frames need not be transmitted, without disturbing transmission and reception of the SACCH frame. If SACCHs are transmitted even when there is temporarily no traffic for a mobile, the number of SACCHs transmitted can be double the number of traffic frames transmitted in every slot. Thus it can be desirable to stagger the frame used for SACCH from one overlapping signal to another so that all SACCHs are not transmitted in the same frame.

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It is also possible to stagger the SACCH transmissions of a single signal so that a SACCH uses, for example, one carrier out of eight on eight successive frames. However, in each timeslot, each subcarrier would then likely contain one overlapping SACCH transmission for a different mobile, and this is perhaps not so convenient for the mobile receiver to handle as when the SACCH in a slot belongs to the same mobile on all eight carriers. Those skilled in the art will appreciate that the particular type of SACCH staggering can be varied to accommodate the needs of a particular system.

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Systems in accordance with the present invention relate principally to mobile communications in the base-to-mobile direction (downlink), but may also be used in the mobile-to-base direction (uplink). However transmitter efficiency trade-offs, as well as factors mentioned in the incorporated patents and patent applications, may suggest constant envelope modulation during mobile transmit bursts. A method incorporating the invention used for downlink is not limited to being associated with a particular uplink method and the invention when used as in the uplink is not limited to use with a particular downlink method.

Thus, claims 33 and 43-48 are not made obvious by a combination of Applicant's background of the invention and Dent.

Claim 43 recites "the signaling word conveys radio channel measurement information from the mobile station to a base station." Neither Dent nor Applicant's Background of the Invention appear to disclose or fairly suggest this limitation. Thus, claim 43 is allowable for this additional reason.

Claim 44 recites "the data word conveys a user-entered keystroke." Dent discloses "user inputs and outputs via keyboard and display..." (col. 8, lines 8-9), but does not disclose "a user-entered keystroke" nor "the data word conveys a user-entered keystroke." Applicant's Background of the Invention does not seem to disclose or fairly suggest this limitation. Thus, claim 44 is allowable for this additional reason.

Claim 45 recites "wherein the data word conveys a HTML code." Neither Dent nor Applicant's Background of the Invention appears to disclose or fairly suggest this limitation. Thus, claim 45 is allowable for this additional reason.

Claim 48 recites "wherein the signaling word conveys Mobile Assisted Handoff (MAHO) information." Neither Dent nor Applicant's Background of the Invention appears to disclose or fairly suggest this limitation. Thus, claim 48 is allowable for this additional reason.

The Patent Office is respectfully requested to reconsider and remove the rejections of the claims 33 and 43-51 under 35 U.S.C. 103(a) based on the Applicant's Background of the Invention and Dent, and to allow all of the pending claims 33 and 43-51 as now presented for examination. An early notification of the allowability of claims 33 and 43-51 is earnestly solicited.

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